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EXAMINER	
WEBB, GREGORY E	
ART UNIT	**PAPER NUMBER**
1751	

DATE MAILED: 03/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 10/826,727	Applicant(s) SINGH ET AL.	
	Examiner Gregory E. Webb	Art Unit 1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *0405,0404*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Nimitz (US5444102).

Concerning the azeotropic, Nimitz teaches the following:

> Azeotropic blends are particularly preferred because they do not change composition on evaporation and thus do not change properties if part of the mixture evaporates. We have developed a proprietary computer program

for predicting azeotrope formation based on the Soave-Redlich-Kwong equation of state and have screened the fluoroiodocarbon blends described herein to identify likely azeotropes. This program also incorporates novel methods we have developed for estimating properties of chemicals and blends: it provides accurate estimates of vapor pressure curves, enthalpies of vaporization, and other properties of interest, allowing selection of optimal blends.(see col. 10, lines 34-51)

Concerning the HFC-32, Nimitz teaches the following:

9. The method of claim 4 wherein the step of providing an additive comprises providing a hydrofluorocarbon selected from the group consisting of: difluoromethane, 1,1-difluoroethane, 1,1,1,2,3,3,3-heptafluoropropane, pentafluoroethane, 1,1,2,2,3-pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,1-trifluoroethane, and trifluoromethane.(see claim 9)

Concerning the CF.sub.3I., Nimitz teaches the following:

11. The method of claim 4 wherein the foam blowing agent is trifluoroiodomethane and the additive is difluoroethene.(see claim 11)

Concerning the stabilizer, Nimitz teaches the following:

An important part of this invention is recognizing that the unique properties of fluorine (the most electronegative element) strengthen and stabilize a carbon-to-iodine bond sufficiently to render selected fluoroiodocarbons relatively nontoxic and stable enough for use in solvent cleaning, refrigeration, foam blowing, and aerosol propulsion. Painstaking

collection and estimation of properties and screening for expected effectiveness, low toxicity, and low environmental impact have been carried out to identify them as being suitable for these new uses. Disclosed herein therefore are both new uses and new combinations of chemicals, leading to new and unexpected results.(see col. 6, lines 31-44)

Concerning the lubricant, Nimitz teaches the following:

All the new refrigeration agents described herein including blends are miscible with the four major groups of lubricants: mineral oil, alkylbenzenes, polyol esters (POEs), and polyalkylene glycols (PAGs). The presence of higher-atomic-weight halogen atoms (chlorine, bromine, or iodine) in an agent, because of the polarizability of these atoms, allows miscibility with these lubricants. A further advantage of hydrocarbon-containing refrigerants is that leak detection is greatly simplified compared to CFCs or HFCs.(see col. 13, lines 8-17)

Concerning the refrigerant, Nimitz teaches the following:

Hydrocarbons including cyclopropane, propane, butane, and isobutane have also been used as highly effective refrigerants. However, hydrocarbons have found little commercial use as refrigerants because of their high flammability. They possess all of the other required properties The ASHRAE Standard 15 limits the use of most hydrocarbons as Class 2 or 3 refrigerants, limiting their use to laboratory equipment with a total charge of less than 3 pounds or to technical/industrial applications

wherein the refrigeration equipment is located remotely from inhabited buildings. These restrictions severely limit the current utility of refrigerants containing hydrocarbons.(see cols. 4-5)

Concerning the propellant and the aerosol, Nimitz teaches the following:

An aerosol propellant must have a high vapor pressure, low heat of vaporization, and stability on storage. In the U.S., CFCs were used as propellants until 1978, and in many countries CFCs are still in use for this purpose. The continued use of CFC aerosol propellants overseas contributes substantially to stratospheric ozone depletion. After 1978 in the U.S. CFCs were replaced by the hydrocarbons butane and isobutane for many propellant applications. These gases are extremely flammable and people have been burned in fires involving these propellants.(see col. 5, lines 57-68)

Claims 1-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Nimitz (US5562861).

Concerning the azeotropic, Nimitz teaches the following:

Azeotropic blends are particularly preferred because they do not change composition on evaporation and thus do not change properties if part of the mixture evaporates. We have developed a proprietary computer program for predicting azeotrope formation based on the Soave-Redlich-Kwong equation of state and have screened the fluoroiodocarbon blends described herein to identify likely azeotropes. This program also incorporates novel

methods we have developed for estimating properties of chemicals and blends: it provides accurate estimates of vapor pressure curves, enthalpies of vaporization, and other properties of interest, allowing selection of optimal blends.(see col. 10, lines 42-54)

Concerning the HFC-32, Nimitz teaches the following:

6. The method of claim 1, wherein the fluoroiodocarbon comprises CF.sub.3 I and the additive comprises 1,1-difluoroethane.(see claim 6)

Concerning the CF.sub.3I., Nimitz teaches the following:

The following nonflammable preferred blends meet the requirements for aerosol propellants: 2 to 15% (by moles) trifluoroiodomethane with 98 to 85% of one or more of the chemicals selected from the group: propane, butane, isobutane, carbon dioxide.(see col. 16)

Concerning the stabilizer, Nimitz teaches the following:

An important part of this invention is recognizing that the unique properties of fluorine (the most electronegative element) strengthen and stabilize a carbon-to-iodine bond sufficiently to render selected fluoroiodocarbons relatively nontoxic and stable enough for use in solvent cleaning, refrigeration, foam blowing, and aerosol propulsion. Painstaking collection and estimation of properties and screening for expected effectiveness, low toxicity, and low environmental impact have been carried out to identify them as being suitable for these new uses. Disclosed herein therefore are both new uses and new combinations of

chemicals, leading to new and unexpected results.(see col. 6, lines 45-56)

Concerning the lubricant, Nimitz teaches the following:

All the new refrigeration agents described herein including blends are miscible with the four major groups of lubricants: mineral oil, alkylbenzenes, polyol esters (POEs), and polyalkylene glycols (PAGs). The presence of higher-atomic-weight halogen atoms (chlorine, bromine, or iodine) in an agent, because of the polarizability of these atoms, allows miscibility with these lubricants. A further advantage of hydrocarbon-containing refrigerants is that leak detection is greatly simplified compared to CFCs or HFCs.(see col. 13, lines 20-30)

Concerning the refrigerant, Nimitz teaches the following:

Hydrocarbons including cyclopropane, propane, butane, and isobutane have also been used as highly effective refrigerants. However, hydrocarbons have found little commercial use as refrigerants because of their high flammability. They possess all of the other required properties. The ASHRAE Standard 15 limits the use of most hydrocarbons as Class 2 or 3 refrigerants, limiting their use to laboratory equipment with a total charge of less than 3 pounds or to technical/industrial applications wherein the refrigeration equipment is located remotely from inhabited buildings. These restrictions severely limit the current utility of refrigerants containing hydrocarbons.(see col. 5, lines 15-27)

Concerning the blowing agent, Nimitz teaches the following:

A foam blowing agent must create uniform, controllable cell size in a polymer matrix, and preferably should provide high insulation value and be nonflammable. For foam blowing a wide variety of agents has been used, including CFC-11, HCFC-22, HCFC-123, HFC-134a, HCFC-141b, and pentane. Water is often added in the foam blowing agent (up to about 25% by moles) to react with the forming polymer, liberating carbon dioxide and aiding cell formation. More recently, some manufacturers have shifted to using water as the exclusive blowing agent, despite slight losses in insulating ability, dimensional stability, and resistance to aging.(see cols. 5-6)

Concerning the propellant, Nimitz teaches the following:

An aerosol propellant must have a high vapor pressure, low heat of vaporization, and stability on storage. In the U.S., CFCs were used as propellants until 1978, and in many countries CFCs are still in use for this purpose. The continued use of CFC aerosol propellants overseas contributes substantially to stratospheric ozone depletion. After 1978 in the U.S. CFCs were replaced by the hydrocarbons butane and isobutane for many propellant applications. These gases are extremely flammable and people have been burned in fires involving these propellants.(see col. 6, lines 7-16)

Concerning the aerosol, Nimitz teaches the following:

1. A method of discharging a liquid composition from a container in aerosol form, comprising providing in the container a mixture of the liquid composition and an aerosol propellant, said aerosol propellant comprising

a blend of at least one fluoroiodocarbon of the formula C.sub.a H.sub.b Br.sub.c Cl.sub.d F.sub.e I.sub.f N.sub.g O.sub.h, wherein a is between and including 1 and 8, b is between and including 0 and 2, c, d, g and h are each between and including 0 and 1, e is between and including 1 and 17, and f is between and including 1 and 2, with at least one additive selected from the group consisting of ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, perfluorocarbons and carbon dioxide, and discharging the mixture from the container, the liquid composition being discharged in aerosol form.(see claim 1)

Claims 1-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Nimitz (US5611210). Concerning the azeotropic, Nimitz teaches the following:

Azeotropic blends are particularly preferred because they do not change composition on evaporation and thus do not change properties if part of the mixture evaporates. We have developed a proprietary computer program for predicting azeotrope formation based on the Soave-Redlich-Kwong equation of state and have screened the fiuoroiodocarbon blends described herein to identify likely azeotropes. This program also incorporates novel methods we have developed for estimating properties of chemicals and blends: it provides accurate estimates of vapor pressure curves, enthalpies of vaporization, and other properties of interest, allowing

selection of optimal blends.(see col. 10, lines 53-68)

Concerning the HFC-32, Nimitz teaches the following:

7. The method of claim 1, wherein the fluoroiodocarbon comprises CF.sub.3 I and the additive comprises 1,1-difluoroethane.(see claim 7)

Concerning the CF.sub.3I., Nimitz teaches the following:

20. The method of claim 1, wherein the fluoroiodocarbon is trifluoroiodomethane and is included in an amount of from 40 mol percent to 60 mol percent.(see claim 20)

Concerning the stabilizer, Nimitz teaches the following:

An important part of this invention is recognizing that the unique properties of fluorine (the most electronegative element) strengthen and stabilize a carbon-to-iodine bond sufficiently to render selected fluoroiodocarbons relatively nontoxic and stable enough for use in solvent cleaning, refrigeration, foam blowing, and aerosol propulsion. Painstaking collection and estimation of properties and screening for expected effectiveness, low toxicity, and low environmental impact have been carried out to identify them as being suitable for these new uses. Disclosed herein therefore are both new uses and new combinations of chemicals, leading to new and unexpected results.(see col. 6, lines 45-58)

Concerning the lubricant, Nimitz teaches the following:

All the new refrigeration agents described herein including blends are miscible with the four major groups of lubricants: mineral oil,

alkylbenzenes, polyol esters (POEs), and polyalkylene glycols (PAGs). The presence of higher-atomic-weight halogen atoms (chlorine, bromine, or iodine) in an agent, because of the polarizability of these atoms, allows miscibility with these lubricants. A further advantage of hydrocarbon-containing refrigerants is that leak detection is greatly simplified compared to CFCs or HFCs.(see col. 13, lines 27-35)

Concerning the refrigerant, Nimitz teaches the following:

Hydrocarbons including cyclopropane, propane, butane, and isobutane have also been used as highly effective refrigerants. However, hydrocarbons have found little commercial use as refrigerants because of their high flammability. They possess all of the other required properties The ASHRAE Standard 15 limits the use of most hydrocarbons as Class 2 or 3 refrigerants, limiting their use to laboratory equipment with a total charge of less than 3 pounds or to technical/industrial applications wherein the refrigeration equipment is located remotely from inhabited buildings. These restrictions severely limit the current utility of refrigerants containing hydrocarbons.(see col. 5, lines 17-28)

Concerning the blowing agent, Nimitz teaches the following:

A foam blowing agent must create uniform, controllable cell size in a polymer matrix, and preferably should provide high insulation value and be nonflammable. For foam blowing a wide variety of agents has been used, including CFC-11, HCFC-22, HCFC-123, HFC-134a, HCFC-141b, and pentane.

> Water is often added in the foam blowing agent (up to about 25% by moles) to react with the forming polymer, liberating carbon dioxide and aiding cell formation. More recently, some manufacturers have shifted to using water as the exclusive blowing agent, despite slight losses in insulating ability, dimensional stability, and resistance to aging.(see cols. 5-6)

Concerning the propellant and the aerosol, Nimitz teaches the following:

> An aerosol propellant must have a high vapor pressure, low heat of vaporization, and stability on storage. In the U.S., CFCs were used as propellants until 1978, and in many countries CFCs are still in use for this purpose. The continued use of CFC aerosol propellants overseas contributes substantially to stratospheric ozone depletion. After 1978 in the U.S. CFCs were replaced by the hydrocarbons butane and isobutane for many propellant applications. These gases are extremely flammable and people have been burned in fires involving these propellants.(see col. 6, lines 8-17)

Claims 1-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Nimitz (US6270689).

Concerning the azeotropic, Nimitz teaches the following:

> In further embodiments of the invention, the compositions consist essentially of the indicated blends of trifluoroiodomethane, 1,1,1,2-tetrafluoroethane and 1,1-difluoroethane, whereby other components

which might materially effect the essential characteristics of the compositions are excluded. For example, in preferred embodiments, the compositions of the invention are nonflammable and are azeotropic or near azeotropic, whereby the compositions are physically stable and do not substantially fractionate during use. Within the context of the present invention, near-azeotropic compositions are those in which the difference in vapor pressures of the components at room temperature is less than 10 psi. Accordingly, the compositions according to the present invention which consist essentially of the recited components in the various preferred embodiments exclude components which would render the compositions flammable and/or render the compositions non-azeotropic or non-near azeotropic, thereby causing the compositions to exhibit substantial fractionation among the components.(see col. 3, lines 10-30)

Concerning the HFC-32, Nimitz teaches the following:

The compositions of the present invention comprise blends of trifluoroiodomethane, 1,1,1,2-tetrafluoroethane (commonly referred to as HFC-134a) and 1,1-difluoroethane (commonly referred to as HFC-152a). It has been determined that compositions comprising blends of these three specific compounds are particularly advantageous for use in refrigeration applications. In a preferred embodiment, the compositions comprise blends of from about 25 mol percent to about 45 mol percent trifluoroiodomethane and a balance of 1,1,1,2-tetrafluoroethane and 1,1-difluoroethane. In a

further preferred embodiment, the balance of 1,1,1,2-tetrafluoroethane and 1,1-difluoroethane comprises equal molar amounts of the two compounds 1,1,1,2-tetrafluoroethane and 1,1-difluoroethane.(see col. 2, lines 45-58)

Concerning the CF.sub.3I., Nimitz teaches the following:

Blend compositions of trifluoroiodomethane, tetrafluoroethane and difluoroethane(see title)

Concerning the lubricant, Nimitz teaches the following:

The compositions of the present invention are suitable for use in refrigeration systems operating over conventional temperature ranges, and over wider temperature ranges, if necessary. The compositions also exhibit good miscibility with polyol ester lubricants. As is known in the art, refrigeration equipment commonly requires constant circulation of a lubricant in the refrigerant fluid to avoid friction, overheating and burnout of the compressor and/or bearings. The compositions of the present invention are particularly suitable for use in connection with the polyol ester lubricants commonly employed for these purposes.(see cols. 3-4)

Concerning the refrigerant, Nimitz teaches the following:

22. A method according to claim 12, wherein the refrigerant composition is operable as a drop-in or near drop-in replacement refrigerant in refrigeration equipment designed for use with 1,1,1,2-tetrafluoroethane or dichlorodifluoromethane.(see claim 22)

Concerning the blowing agent and the propellant, Nimitz teaches the following:

Chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and/or blends containing these compounds have conventionally been used as refrigerants, solvents, foam blowing agents, propellants and the like. However, because of their high chemical stability and long atmospheric lifetimes, such compounds, when released to the atmosphere, migrate to the stratosphere where they undergo photolysis and deplete the earth's protective ozone layer. CFCs particularly contribute to depletion of the ozone layer, with the HCFCs depleting the ozone layer to a lesser extent. As a result, production of CFCs and HCFCs has been and continues to be severely limited and is scheduled for phase out in many industrialized and non-industrialized countries.(see col. 1, lines 15-30)

Concerning the aerosol, Nimitz teaches the following:

Accordingly, a need exists to develop materials which can be used as efficient and economical substitutes for CFC and/or HCFCs in a wide variety of applications, including refrigeration, solvent use (for example in chemical manufacturing and solvent cleaning applications), polymer foam blowing, and propulsion (for example, aerosol propellants), and the like. The Nimitz et al U.S. Pat. Nos. 5,444,102, 5,562,861, 5,605,647 and 5,611,210 broadly disclose blends of fluoroiodocarbon compounds and various additives as substitutes for CFCs, HCFCs and/or Halons. The fluoroiodocarbon blends of Nimitz et al are disclosed as advantageous for use in a variety of applications, including refrigeration, solvent

cleaning, foam blowing, aerosol propulsion and firefighting, owing to the desirable combinations of properties provided by such blends. For example, the blends are disclosed as nonflammable, non-toxic and environmentally benign in having zero ozone depletion potentials, low global warming potentials and negligible atmospheric and terrestrial environmental impacts.(see col. 1, lines 32-50)

Claims 1-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Cho (US6649079).

Concerning the azeotropic and the HFC-32, Cho teaches the following:

The composition according to the present invention contains azeotropic mixture of isobutane and 1,1-difluoroethane, and optionally an additive which improves non-flammability.(see col. 4, lines 1-5)

Concerning the CF.sub.3I., Cho teaches the following:

As shown in Table 6, the ignition temperature was remarkably increased by the addition of carbon dioxide (CO.sub.2) or trifluoromethyl iodide (CF.sub.3 I). However, as the amount added exceeds 5 wt %, cooling capacity and COP might be reduced. Therefore, it is desirable to add these additives less than 5 wt %.(see table 6)

Concerning the lubricant, Cho teaches the following:

HFC refrigerants have been widely used as a substitution refrigerant for CFC-12, but there are questions as to the environmental safety of such HFC's. Especially, since HFC-134a (CH.sub.2 FCF.sub.3), most widely used

among HFC refrigerants, has lower volumetric cooling capacity and coefficient of performance with high compressing ratio than CFC, it consumes more electricity than CFC-12 refrigerant does. Because of its poor compatibility with a refrigerating oil, special oils like ester oils or poly alkylene glycol (PAG) oils are necessarily required rather than mineral oils. However, the ester oils or PAG oils may cause significant damages to a refrigerator by the absorption of moisture when they are exposed to the air. For these reasons, they cannot be directly dropped in the refrigerator systems adopting CFC-12 refrigerant. That is, systemic changes of the conventional refrigerator systems such as a compressor and the manufacturing equipments are necessarily required. Also, the HFC refrigerants are not environment-friendly. Specifically, the global warming potential (GWP) of HFC-134a is about 300 (CO.sub.2 =1, 100 yr), which is very high.(see col. 2, lines 5-30)

Concerning the refrigerant, Cho teaches the following:

Although R-500 (CF.sub.2 Cl.sub.2 /CHF.sub.2 Cl.sub.2) is an excellent refrigerant showing azeotropic behavior, which is a mixture of 2 kinds of refrigerants but acts as a single refrigerant, the use thereof is also restricted because it contains Freon refrigerant which causes environmental pollution and destroys ozone layer.(see col. 2, lines 25-30)

Claims 1-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Cho (US6843930).

Concerning the azeotropic, Cho teaches the following:

> FIG. 1 is a pressure-enthalpy diagram in which the characteristics of azeotropic refrigerants were measured and analyzed.(see fig. 1)

Concerning the HFC-32 and the refrigerant, Cho teaches the following:

> 3. A refrigerant composition for use in high back pressure condition, containing a refrigerant and an additive, wherein a) the refrigerant is a mixture of propane and 1,1-difluoroethane, the content of the propane is in amount of 50.about.70 wt %, the content of the 1,1-difluoroethane is in an amount of 30.about.50 wt % and the sum of the propane and the 1,1-difluoroethane is 100% based on the total weight of the refrigerant, b) the additive is selected from the group consisting of carbon dioxide (CO.sub.2), trifluoromethyl iodide (CF.sub.3 I) an mixture thereof, the content of the additive is in an amount of less than 5 wt % based on the refrigerant, and c) the refrigerant composition shows an azeotropic behavior.(see claim 3)

Concerning the CF.sub.3I., Cho teaches the following:

> According to the particular preferred embodiment of the present invention, the composition comprising 32-33 wt % of propane, 65-67 wt % of propylene, and 1-2 wt % of an additive selected from the group consisting of carbon dioxide, trifluoromethyl iodide and mixture thereof, based on the total

weight of the refrigerant composition; 55-57 wt % of propane, 41-43 wt % of 1,1-difluoroethane and 1-2 wt % of an additive selected from the group consisting of carbon dioxide, trifluoromethyl iodide and mixture thereof, based on the total weight of the refrigerant composition is more preferable.(see col. 4, lines 53-63)

Concerning the lubricant, Cho teaches the following:

As shown in Tables 2 and 3 refrigerant R-407C suggested as a substitute for HCFC-22 has zero value of ozone layer destroy potential and high cooling capacity, but this refrigerant had high global warming potential, specifically 1530, and special ester oils should be used as a refrigerant oil rather than mineral oils. Further it has low coefficient of performance, and 8% higher evaporating and condensing pressures that HCFC-22, and exhibited non-azeotropic behavior in which 4.5-4.8.degree. C. of the temperature grade occurred. R-410A showed improved azeotropic behavior, but the global warming potential was 1730, and ester oils rather than mineral oils should be used as a refrigerant oil. Volumetric cooling capacity thereof was proven to be more excellent than HCFC-22, but the vapor pressure behavior was 56% higher that HCFC-22, which prohibit direct application of the refrigerant to the HCFC-22 refrigerator systems. However, the composition according to the present invention, SR-20 series had lower global warming potential and higher volumetric cooling capacity and coefficient of performance than HCFC-22. Further, they showed similar

vapor pressure behavior with HCFC and an azeotropic behavior in which temperature grade did not occur.(see cols. 9-10)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglass McGinty can be reached on (571)272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gregory E. Webb
Primary Examiner
Art Unit 1751

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